DOCUMENT RESUME

ED 052 486 24 CG 006 494

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TITLE Changing Perspectives in Education and Self-Correcting Thinking. Information System for Vocational Decisions.
INSTITUTION Harvard Univ., Cambridge, Mass. Graduate School of Education.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
REPORT NO PR-27
BUREAU NO BR-6-1819
PUB DATE Dec 69
GRANT OEG-1-6-061819-2240
NOTE 60p.

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS *Changing Attitudes, Cognitive Development, Cognitive Processes, Education, Educational Change, Educational Needs, Learning, *Learning Processes, *Social Change, *Technological Advancement, *Thought Processes

ABSTRACT

The major concerns of this paper are the varying ways of approaching, diagnosing and solving the problems besetting education as a result of the rapid technological and social changes which uniquely characterize our own day. Three chapters address various aspects of thinking and of education. The first proposes a definition of the educational process, and formulates the rationale, objectives, theoretical assumptions, and educational implications of the paper's major concept, "self-correcting thinking", defined as thinking which inherently tends toward progressively increasing accuracy, ever increasing reality-orientation, and ever wider and deeper comprehension. Chapter Two focuses on: (1) the characteristics of "self-correcting thinking"; (2) perspectives critically influencing thinking; and (3) the relationship of these to possibilities for learning. The final chapter discusses some seminal books and papers (e.g., of Arieti and Bettelheim) which are related to the paper's premises. (TL)

ED052486

INFORMATION SYSTEM FOR VOCATIONAL DECISIONS

Project Report No. 27

CHANGING PERSPECTIVES IN EDUCATION

AND

SELF-CORRECTING THINKING

Myra T. Gannaway

This paper was supported in part by Grant No. OEG-1-6-061819-2240
of the United States Office of Education under terms of the
Vocational Education Act of 1963.

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December 1969

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What we must reach for is a perpetual self-discovery, perpetual reshaping to realize one's best self, to be the person one can be.

John Gardner

In Excellence

CHAPTER I

CHANGING PERSPECTIVES IN EDUCATION

Introduction

> Unprecedented advances in science are forming uniquely rapid changes in the life of the individual and of society. Parallel with this there is the now unmistakable collapse of values . . . and the sense of the unstability, uncertainty, and absurdity of many human habits. Many persons have reached the conclusion that a major change in human awareness and behavior is now taking place.
>
> (Whyte, 1968)

Even the most cursory glance at the education section in bookstores is enough to communicate the seriousness and the magnitude of the effect of these rapid changes on education. *Our Children Are Dying* (Hentoff, 1966), *Violence in the Streets* (Endleman, 1968), *Crisis at St. John's: Strike and Revolution on the Catholic Campus* (Samecca and Darniano, 1968), and *The Academic Revolution* (Jencks and Riesman, 1968) are illustrative of topics and titles which are becoming increasingly frequent among educational books of today.

Our social institutions are beset, within and without, by the effects of these societal changes as they continue to proceed at a tremendously accelerated pace. Education is, willingly or not, confronted with a challenge of substanial proportions. It is a challenge that unavoidably requires, and merits, action that is responsible, responsive, effective, immediate, wide-ranging and far-reaching.

There are of course varying ways of approaching and diagnosing problems, of generating alternative solutions for them, of proposing, and of executing, appropriate and constructive action in an effort to effect resolution.

It is precisely these that are the major focus of this paper. Changes and advances are presently occurring in manner of thinking too; changes that are observable in, and demonstrated by, contemporary orientations and evolutionary ways of responding.

Along with the advances in scientific thought, is a concurrent advancement of man's comprehension of the processes of understanding, the processes of turning experience into knowledge, the processes of making meaning.

The three chapters comprising this paper will address various aspects of thinking and of education, the latter a topic which seems to be defined in various and often directly contradictory terms by different people. Having stated the focus, this chapter will set the context by proposing a definition of the educational process. This will be followed by the rationale for choice of topic, by a description of objectives and means, and by definitions of basic terms.

The chapter will conclude by furnishing theoretical assumptions which are most pertinent to its purposes, and some implications for education that were drawn from these assumptions. The first chapter thus serves mainly as a means of clearing the ground, and of stating the context for the remaining two chapters.

Major foci in the second chapter will include the characteristics of self-correcting thinking, perspectives critically influencing thinking, and the relationship of these to possibilities for learning.

The third and final chapter will discuss some seminal books and papers which are related to the paper's premises.

The present context is one of increasingly rapid changes, both external, as exemplified in scientific and technological advances, and internal, as exemplified by the advanced thinking which necessarily is a precursor to the external changes. With cognizance of these changes, a brief and contemporary "job-analysis" of education is proposed below.

Defining the Educational Process

Education inheres in a relationship -- a relationship created by at least three complex and interdependent components in dynamic interaction -- information, communication, and individuals.

Whatever activities, learning, or behavior that occurs, and whatever the educational setting, they will depend to a large extent upon common variables. Each and all possible learning responses are essentially determined by environmental factors -- particularly the interpersonal interactions --

and by the individual's level of mental (psychological) development, and its degree of integration. This includes the effects of constitutional factors.

Educational processes, interpersonal processes, and the individual's mental, or psychological, processes are fundamentally intertwined. A concern with education is necessarily a concern with their complex interrelationships, as well as with each, in and of itself.

Each of these interacting aspects are reflected in identical derivatives -- thinking processes and their communicable products. A clear understanding of thinking processes is essential in order to understand the learner's processing and using of information, his growth in ability to communicate more accurately and more relevantly, his concomitant growth in interpersonal processes, in academic skills; indeed, to understand his total mental development. This is best understood not solely through separate specificities, but also and especially through understanding the underlying principles which regulate the ways these mental processes operate.

Rationale

This paper will focus mainly on one particular way of thinking. A major objective is to make explicit an evolutionary way of thinking, herein termed self-correcting thinking. It will be defined in a following section. There are several reasons for such a selection. In the light of the tremendous advances in recent knowledge concerning mental development, it seemed the time had come to try to discover the single, most essential requirement for viable learning.

A focus was sought that was central to education. One that simultaneously could, in some objectified form, be useful for purposes of teaching, of study, and of learning. This was considered essential in order to minimize to some degree the expectably automatic defensive and/or aggressive reactions from those who are confronted with the necessity to accommodate to new knowledge.

An educational focus was sought that was no less central to personality development than it was to learning. This was to help insure the likelihood that whatever was initiated with the hope of maximizing the

learner's academic development would simultaneously strengthen the individual's personality development, i.e., his total mental development.

A focus was sought that was central both to the teacher's understanding and actions, and also to the learner's understanding and actions. This is considered essential to maximize the possibility that the teaching-learning relationship can move toward becoming less hierarchic and authoritarian, and more task-oriented.

A focus was sought that was superordinate, that was of a depth sufficient to cause -- automatically, as a corollary of its own changing -- a very wide range of congruent other changes. It is felt that changes which are effective across the board are presently needed in education.

Thinking processes are seen as potentially fulfilling all of these requirements. They are central to academic development, and central to personality development, and their products are isolable for study. To enable the learner's thinking processes continuously to progress to higher levels of integration, and to become increasingly more reality-oriented is, by definition, to enable sounder mental, psychological, or personality development.

As the teacher learns about the student's way of thinking he learns about thinking processes in general, including his own and the effects of his own on others. Moreover, in such a context, feedback from student to teacher and vice versa, is invaluable to each, mutual dialogue thereby increasing the opportunities for growth, understanding, and development for both. Unless individuals observe and have others observe and give them feedback, they cannot verify as being generally true what, for all they know, may be only a private, uncorrected bias.

Because there is still much to learn about thinking processes, the teacher will necessarily be a learner too. At the same time, enough is already known about thinking processes for a few professionals in the field of psychology to be writing very succinctly about them.

If the ways of thinking that are learned, demonstrated, modeled, catalyzed, and encouraged are continuously being raised to increasingly higher levels of integration, the changes in learning behavior, as well as the changes in educators' behavior, could be anticipated to mean changes all across the board. Qualitatively one could hardly predict or measure what

kind of a world might evolve if task-oriented, constructive behavior became the norm for politicians and educators.

Effects would not be restricted to the classrooms, but rather would affect total mental development and therefore all behavior. Learning, in the deeper sense, is relevant to all life experiences. If educators learn how to behave in a way that actually enables another increasingly to utilize his potential, this would have relevance far beyond any classroom.

Psychologists are showing us that this need not be an idealistic nor an unreasonable hope.

Psychopathological thinking has been conceptualized mainly in terms of how it deviates from normal thinking. Education should be particularly concerned with further differentiating and conceptualizing the wide range of normal thinking processes. This could result in more comprehension, by both education and psychology, of the critical overlapping area between normal and distorted processing. Emphasis on thinking processes could result in the present somewhat undefined, unwilling, and unilateral relationship between psychology and education becoming truly collaborative, to the benefit of all concerned, and especially to the students.

"Psychology's ancient problem has been to define the nature of conceptual thought, education's to foster it." (White, 1968) It is to psychologists that educators now look in order to begin acquiring a systematic understanding of thinking processes. Since psychologists traditionally have treated a very restricted sample of the total population, it is to educators that psychologists would look for examples of ways of thinking manifesting a much broader range, qualitatively and quantitatively. Such breadth and depth would expand, broaden, and deepen psychology's own understanding of normal and of higher-level processing, simultaneously expanding its knowledge and understanding about ways persons can digress from such developing.

A study of thinking is as indispensable for the educator as it is for the psychologist, for peculiarities of misunderstanding, or deformed thinking, are as diagnostic for one as for the other. They are also a promising means for discovering whether an individual needs referring to another professional.

> Seen from *outside* the person, all emotional disturbance is marked by some serious breakdown in communication with others. . . . When improved conditions

> or treatment enable the person to acquaint himself and others with his feelings and thoughts, and to correctly receive the communication of others, his disturbance is removed.
>
> (Bettelheim, 1966)

To become more aware of, more knowledgeable about, and more skillful in, catalyzing and encouraging higher-level thinking, whatever the starting point, is thus seen as a central focus potentially of great usefulness for education and also for psychology.

Ways of thinking are simultaneously a diagnostic indicator of academic development and of personality development. In actual fact, they are the diagnostic indicator par excellence.

Objectives and Means

In order to have something concrete to which to refer when defining objectives and means, and when discussing abstractions relevant to self-correcting thinking, there is below a very brief, specific sample of two interactions.

> Two mothers, each with a child, approach the nursery school door; it is the first day of school.
>
> Mother A says to her child, "Get the hell in that room right now, and I mean right *now*."
>
> Mother B says to her child, "It's time for you to go in now, son."

In the sample above the content message is, for all practical purposes, equivalent. That is, both communicate, "go in now." In a purely content sense the messages could thus be perceived as equivalent and equally appropriate.

When the appropriateness of the *manner* in which this content was communicated is the focus however, the situation becomes quite different. There are then two quite disparate communications. Which is the most and which is the least reality-oriented could conceivably shift from one to the other, according to the particular environment and according to the particular needs of that particular mother and that particular child at that particular time.

Mother A's communication is an order, revealing the assumption that threat and/or force are required if her child is to behave in an appropriate way. She reveals the assumption that control, not information or reasonableness, is the dominant issue in this interaction, and that she

mistrusts her child's response unless he is threatened, and therefore fearful.

Mother B's communication stems from the assumption that her child can be trusted to respond in a reasonable manner if he has adequate information.

In the example, the manner, the way, and/or the *process* of communicating, and interacting, manifest the assumptions operating in forming and in organizing the communications. That is, they reveal the thinking that was utilized before the communication was available in verbal form. This manner or process of thinking can be identified, observed, examined, described, referred to, illustrated, and demonstrated explicitly. Process can be identified, and its implications can be understood, just as content can.

Also, since it can be recognized that Mother A's communication takes the form of a threat, and it is presently believed that defensiveness is a common consequence of threat, it is possible to identify other concomitant aspects of the communication. Current knowledge strongly indicates that defensiveness most generally results in lowered productivity and efficiency. There is thus justification for assuming that Mother A's *manner* of communicating, i.e., her processes of thinking which resulted in this command, is likely to have a negative effect in a learning situation, since learning generally requires both sustained productivity and sustained efficiency.

It is thus possible to examine communications and interactions in terms of the content message per se, in terms of the content as process product, in terms of process, and in terms of process effects on learning.

In the example, the content message is "go in now"; the process products: Mother A) an order; Mother B) information; the processes: A) threat-determined, control-determined; B) trust-and-reason determined, reality-determined; the process effects on learning: A) fear with the probable consequences of lowered productivity, lowered efficiency; resentment, blocking; B) trust, reasonableness, with the probable consequences of cooperation, confidence, and autonomy.

Examples of thinking that are self-correcting will be provided near the end of Chapter II.

This paper has two major objectives. The first is to explicate self-correcting thinking; the second is to elucidate some of the relationships between thinking processes and learning processes. Objectives are mainly to define, illustrate and specify. At this time developmental stages, or age and grade-specific details will not be addressed. Rather the goal is to establish the possibility and feasibility of using the broad principles discussed herein, whatever the specific age and/or grade.

As means for reaching the objectives stated above, content will be viewed in several interdependent but distinct ways. First, content will be viewed as content per se, as communicated information.

In addition this identical content will be viewed in quite another way, since content is simultaneously a product of a particular way of functioning and thinking, and therefore illustrates and reveals specifiable ways of thinking. Not all kinds of content reveal the processes of which they are the product, but kinds that do can be elicited easily, when that is desired.

Content viewed in this way identifies a way of operating, a way of structuring one's perceiving and thinking; it identifies the processes of thinking that one's way of operating reveals.

The effects of certain ways of thinking are specifiable in terms of the interactions they make possible or impossible with others, in terms of their effects on others, and in terms of their effects on learning and development.

Some subtle but very substantial differences in processes of thinking are presently being perceived, conceptualized, communicated, and discussed (Arieti, 1967; Bettelheim, 1966; Biber, 1955; Gendlin, 1962; Graves, April 2; Hayakawa, 1950; Kelly, 1955; Menninger, 1968; Polanyi, 1966b; Richards, 1951; Scheffler, 1967; and Shapiro, 1965). Some of these concepts are detailed and ordered and an integral part of comprehensive theories (Arieti, 1967; Bettelheim, 1966; and Shapiro, 1965).

Some of the most recent explications (Arieti, 1967; Bettelheim, 1966; and Shapiro, 1965) are clear and sophisticated enough to make it possible for characteristics of thinking processes to become quite explicit for any who care to study them. They make it possible to view

communications and interactions simultaneously in terms of information, as results of prior processing, and in terms of their effects on learning processes.

Definition of Terms

Self-correcting thinking is simply what the term implies: ways of thinking which inherently tend toward self-correction. The term "correct" is used in the sense of "manifesting good contact with reality" and in the sense of "accurate". It is not assumed nor expected that humans normally attain perfect correctness and/or accuracy. Rather these terms are used in the sense of "with a minimal amount of distortion."

The concept of self-correcting thinking distinctly implies a progressively increasing accuracy, ever-increasing reality-orientation, and ever wider and deeper comprehension. Indeed, those are the specific objectives, as well as the raison d'etre of self-correcting thinking.

Thinking, if it is to be self-correcting, entails certain specifiable characteristics. In order for any outcome to be congruent with the stated objectives, the process characteristics must, first of all, be rigorously congruent with such objectives. That is, means must be congruent with ends or they will most likely result in other ends.

Congruent mean/ends maximize the possibility that the outcome -- including process, or operational outcome, and also product, or content outcome -- will coincide with the stated objectives. Otherwise process and content may contradict each other with the likelihood that the content message will be negated or confused. Such outcomes are recognized in such sayings as "Actions speak louder than words" and "Don't do what I do, do what I say."

Self-correcting thinking has several major characteristics, each independent, interdependent, and observable over time. These characteristics derive from a genuine wish to understand reality.

Self-correcting thinking processes tend toward more precise differentiating and more inclusive integrating, toward the perception of ever-larger wholes; they tend toward increasing reality-orientation and toward increasing accuracy; they manifest viewpoint awareness; and process awareness; and they operate on the firm assumption that there is always more to learn.

The term "viewpoint awareness" refers to a continuous awareness, understanding, and assumption that anything to which one gives his attention may exist in manifold ways, manifest itself in multiple forms, and may be viewed from manifold perspectives, some of which will be superordinate, and others subordinate. Simultaneously it refers to the awareness and assumption that only by continuously examining one's own assumptions can one make use of new understandings in behavior that was previously automatic and habituated.

In short, there is a continuous seeking for larger and deeper understanding, corrective change is recognized as desirable, and it is continuously facilitated. Most significantly, these understandings are viable; they form a constant orientation that is continually reflected in the thinking and operating, and inherently tend toward perception that embraces and utilizes incoming information, whether it concerns the new, strange, and different, or subtle shadings of the old.

Characteristics accompanying self-correcting thinking include a flexible and appropriate use of understandings of both teleologic and deterministic causality, and also appropriate use of understandings regarding the multicausality of behavior, including motivational and developmental aspects.

The remainder of this paper is a systematic attempt to further describe, differentiate, and clarify the multiple connotations of interconnections among the characteristics of self-correcting thinking. Because self-correcting thinking consists of multiple complex aspects which are differentially interdependent, because it changes forms and processes in varying ways at varying times for varying purposes, it is not possible to discuss such complexity in a straight-forward, simple, linear fashion. Necessarily there will be side excursions to discuss certain aspects individually. Then there will be a rejoining and gathering up of whatever aspects can be carried forward in a broader stream until again, one aspect requires individual attention, and a reorganization of the whole to include the new in the subsequent discussion. This process itself, as well as its objective -- to understand self-correcting thinking -- essentially is a reach for wholeness.

Erikson (1950) has explained that in the absence of any simple sequence and causal chain "only a systematic going around in circles can

gradually clarify the relativities of all the known data" and enable us to understand and to have an intelligent and predictable effect upon the situation.

This paper began by setting a context, and by stating a focus. It defined the educational process as a relationship of interdependent components in dynamic interaction. It then offered a rationale for the choice of focus, and described specific objectives and means.

These objectives and means were followed by definitions of terms, and concluded the clearing of the ground. They thus lead to a stating of assumptions, for only very particular assumptions could give rise to the preceding selection of premises.

Theoretical Assumptions

The theoretical concepts which constitute the foundation of this paper are numerous (Arieti, 1967; Bettelheim, 1966; Erikson, 1950; Freud, 1965; Graves, April 2; Grene, 1966; Summer Reading Book, 1968; Richards, 1955; Thomas, Chess, and Birch, 1968; and Whyte, 1968), quite recent, and supported by other contemporary thinkers who happen to be concerned with mental phenomena (Bronowski, 1965; Hayakawa, 1950; Maslow, 1966; Menninger, 1968; Polanyi, 1966a; and Shapiro, 1965). Each of these concepts is subscribed to by many theorists.

Some of the assumptions which are particularly pertinent to the concepts which underpin and overarch the body of this paper, constitute the following framework:

Development is by nature order-creating, order-stabilizing, and order-maintaining. At every age, behavior is characterized by some form of logic. Development can be trusted to follow the same inner-ordering principles that it did in forming each individual before his birth, that it does in ordering physical growth, and in ordering the maturing of abilities, if it is unimpeded by misdirected and fortuitous external influences and if it receives responsible and appropriate response to its strivings. Particularly critical for sound development is the opportunity to take action in one's own behalf and on one's own terms, in a context of concerned and responsive mutuality.

Thinking is a process that is inherently goal directed. Thinking is toward personal ends which are intrinsically motivational for that individual. Knowing is, at its deepest levels, an affective activity, and each stage of thinking processes is accompanied by affect, or emotions. Intellectual development is based on emotions. If the requisite emotional experiences are lacking, the intellectual development will become, and will remain, stunted, until the requisite experiences become available and can be utilized.

If emotional and cognitive development are catalyzed, receive appropriate response, and also are unimpeded, they will develop normally. Mainly normal development requires appropriate resources and catalysts. During development, emotional and cognitive components create and maintain a functional equilibrium, an equilibrium which is neurological as well as psychological and which enhances total development.

It is the emotional components of thinking which determine whether thinking becomes arrested, detours, regresses, or advances. Concurrently, cognitive processes themselves create emotional situations and thus evolve into major dynamic forces in and of themselves. Only the final stages of thinking are in awareness.

Current thinking with regard to development and behavior increasingly focuses on the uniqueness of the individual (Thomas, Chess, and Birch, 1968). Individuals are simultaneously social and individual, and therefore both internal and external stimuli are relevant in every situation. Their emphases shift fairly continuously, depending upon numerous differential variables.

An individual, regardless of age, if development is proceeding normally, can be trusted to respond selectively to those situational aspects which are most useful and beneficial to his own development, if the range and variety available for his selection is sufficient and adequate. Inappropriate response is often an indication of insufficient availability of options and the concommitant blocking of experiences essential for furthering individual growth and development.

In a teaching-learning situation, collaborative goals evolving from mutually desired choices of both teacher and learner are vastly superior to teacher-imposed external goals. An individual's development depends on

what the individual himself can make of his own experiences, his conceptual life, his interpersonal relations, his own work and actions. It depends, in other words, on how successfully he himself can create his own personal meaning from his own particular life experiences. There can be no personal growth unless the learner takes action for himself.

Normally growth is an infinite process. In the absence of organic impairment and psychopathological impairment, the mind is capable of growth as long as there is life.

An individual's thinking processes are potentially his most powerful and valuable instruments for survival. Simultaneously they are his most valuable and powerful instruments for comprehending. That these processes are permitted to develop to the highest degree possible is of utmost concern, both to the individual and to his society.

The urge to complete development is immeasurably strong. There seems to be in each individual a strong drive toward wholeness, toward becoming all that it is possible for one to become. Normally something within protests at one's own inabilities, unawareness, and distortions. Unless impaired, the organism irrepressibly strives toward more healthy and more total development.

On assumptions such as these, this paper rests.

Implications for Education

Education should involve an exposure to wholeness, to perception of the whole and response to the whole, to whole persons, not merely fragmented and efficient role-players, but to well-balanced and vital persons who live full lives and enjoy doing so.

Educators can learn to become liberators of tremendously impressive talents and of very powerful forces for growth.

Traditional ways of teaching now seem to have been inefficient in catalyzing the potentials of our human resources, and in this way have deprived society of enormous contributions.

Deutsch (1967) bluntly says that,

> The orientation the school uses is obviously not successful. . . . Children who have the capability for learning simply are not learning in school. . . . The major emphasis must be on finding appropriate ways of

> educating children. . . . The fault lies with the curriculum, organization, and methods of the school, not with the children or their parents.

And Kubie (1954), even more bluntly, says that,

> . . . In spite of a growing knowledge of the world around him [man] has repeated like an automaton the errors of his past; and furthermore he has repeated these old errors in forms which become increasingly destructive and catastrophic as he becomes more educated.

Schools have traditionally functioned on incorrect assumptions about human nature, human growth and development, human needs, and human learning. This is not too surprising since their organization occurred before such knowledge was readily available. At the same time it is inconceivable that educators' ways of thinking should continue to demonstrate an inability to learn from experience and from accumulated knowledge. Schools have been found to limit and to restrict the growth of almost all persons within them, in part because of the rigid, rule-ridden structure of the systems themselves (Biber, 1959a; Biber, 1963; Bundy, 1967; Deutsch, 1967; Henry, 1963; Hentoff, 1966; Lippitt, Watson, and Westley, 1958; Long, Morse, and Newman, 1965; Menninger, 1968; Newman, 1967a; Richards, 1955).

The ways that individuals feel about themselves and their environment, about the people in that environment, and about the tasks that environment sets before them, profoundly affect their actions and their learning.

Ekstein (1968) has stated that we neither want to separate nor to merge the learner's awareness of his inner world and his awareness of external reality. We want to create a bridge between them which will enable him to continuously and simultaneously heighten awareness of both. Self-correcting thinking creates such a bridge.

Those whose processing is inherently self-defeating will always be at a disadvantage. Both educator and learner, if unable to create a bridge connecting inner and outer understandings, may require special assistance. The healthy individual eagerly takes advantage of additional opportunities to make meaning out of his life.

In fact, positive changes flow natually when individuals and groups feel a satisfying identification and feel capable of, and permitted to, influence their environment. Individuals who feel secure seek out challenges, growth, responsibility, and work. They expect both to give and to receive

satisfying experiences and satisfying relationships. Thus they become increasingly capable of constructive action and of handling ever more challenging tasks (*News and Reports*, 1968).

It seems imperative in this country, at this point in time, to begin to state educational goals in terms of the individual learner. This would be in order not to unwittingly equate teaching and learning as traditionally has been done; in order to structure in the possibility of differentiating *what* the teacher does from *how* it is done; and also to differentiate both of these from what they make it possible and impossible for the learner to do.

What the teacher does is an act that is separate and distinct from the act that another person, the learner, either contemporaneously or subsequently does. Although the two are often closely related, they are not equivalent and indeed may not even be similar.

Recognition, acceptance, and utilization of the recent knowledge concerning human nature and interactions, is one of the threatening challenges which now confronts education. Defensive reactions are expectable in such situations. It is therefore critically important to begin to gather information on how persons acquire the processes of learning to see what they have previously overlooked; how they learn the processes of examining their own assumptions and expectations; and how they learn the processes of understanding their own biases.

To these issues regarding learning and thinking, the next chapter will be addressed.

CHAPTER II

SELF-CORRECTING THINKING

Introduction

Concepts evolve, changing over time. Concepts which are presently in the process of undergoing considerable change include those regarding mental illness, sex, normality, permissible behavior, attainable life styles, presidential elections, educational goals, and surely most surprising of all, concepts regarding official death.

Concepts regarding concepts, comprehending about comprehending, knowing about knowing, and looking at looking are also examples of concepts evolving with considerable changes, changes which also are observable at the present time. Such labeling at first glance seems hardly to be taken seriously, yet though the changes are often very subtle, their implications may be highly significant.

Earlier this year, L. L. Whyte (1968) commented that "It seems that we are now at the moment when mind becomes aware of the ordering process of which it is itself the most powerful expression."

Whyte uses the term "global" in the sense of "associated with the totality of any system of entities." He defines the term "separatist" as "concerned only with the separate parts of a system taken one by one, neglecting its global features." He entitled his article "The End of the Age of Separatism" and in it writes that his vocation has been "to work out, as far as I can, the implications for science and for man of the personal experience of passing from separatist confusion toward a global clarity."

Whyte thus uses the word "global" to refer to a much higher level of abstraction and complexity than the non-technical individual commonly uses or comprehends. Primary suggestions are characteristic of every level of thinking, from the lowest to the highest. That is, globality is characteristic of both primitive thinking processes and of thinking processes of the highest level of integration. Globality is characteristic of Einstein's style of thinking and of Poincaré's when they were working out some of the most startlingly brilliant and innovative thinking the world

has ever known. Creative innovations cannot occur without some diffuseness and globality. Otherwise one's thinking remains within whatever specified, traditional, status quo patterns one's cultural environment provides.

Discriminations concerning thinking processes apparently are rarely made. The term "global", even among the more educated, seems more generally to be used in an absolutist, dichotomous fashion, categorizing anything global as being wholly negative. Such categorization reveals a misidentification of a part with a whole, and confusion of similarity with identity.

Another author also proffered a revealing, differentiating, and predictive comment about thinking earlier this year. I. A. Richards (1968) suggested, or rather directed, that one look into the point of view metaphor more closely, and bring it into sharper focus, "and it can seem to become momentous, nothing less than a set of hints toward a series of new concepts for the new education required for the current, and the coming, worlds." He further explicates this line of thought mainly with regard to visual experiments, but the concept is surely seminal for education.

The way of thinking alluded to by both Whyte and Richards is directly relevant to the way of thinking and operating which is described in this paper as being inherently self-correcting. The single most significant characteristic of self-correcting thinking is thought to be revealed by viewpoint awareness. It is a major means of avoiding and/or correcting distortion.

Viewpoint awareness presupposes the assumption that there is always more th*at* one can learn, and always more th*an* one can learn. It normally involves a continually increasing differentiation, more inclusive integration, increasing perception and response to wholes, increasing reality-orientation and accuracy, and, at some point, increasing process awareness.

This chapter will first discuss some distinctive orientations that are currently correcting understanding of physical reality. That will be followed by a discussion of impediments to self-correcting thinking, and of other dimensions critical to such thinking. The chapter will include examples illustrating thinking that is self-correcting.

Fields other than education and psychology are also concerned with self-correction. Presently there are many modern conceptualizations in scientific fields which throw new light on the whole notion of perspectives, on learning, and thus on new ways of thinking.

Changing Perspectives re Physical Reality

> Truth tends, by definition, to be radical and subversive of the existing order.
>
> Naom Chomsky

Several conceptualizations from modern science describe new ways of perceiving and appraising reality that can profitably be taken as direct analogues for conceptualizations in other fields. Taken as a group they communicate a strong message about alternative orientations. And they raise the question of a possible need for a repertoire of perspectives in every field, a view that sharply contrasts with the traditional educational, single-valued, rule-ridden approach to reality, and the concomitant investment in "right answers."

> Modern science has taught us that the so-called objective world is itself a relationship between the observer and the observed, so that ultimately we are able to know nothing but that relationship.
>
> (Hayakawa, 1950)

> All motion must be defined relative to a frame of reference, and space and time are relative rather than absolute concepts.
>
> *theory of relativity*

> The accurate measurement of one of two related, observable quantities, as position and momentum or energy and time, produces uncertainties in the measurement of the other, such that the product of the uncertainties of both quantities is equal to or greater than $h/2\pi$ where h is approximately equal to 6.624×10^{-27} erg-seconds.
>
> *uncertainty principle*

> In the atomic world it is not possible to describe the atomic system under investigation in abstraction from the apparatus used for the investigation by a single, unique objective model. Rather a variety of models, each corresponding to a possible experimental arrangement and all required for a complete description of possible physical experience, stand in complementary relation to one another, in that the actual realization of any one model excludes the realization of the others, yet each is a necessary part of the complete description of experience in the atomic world.
>
> *theory of complementarity*
> (Richards, 1955)

> If you draw a figure of intersecting lines and curves on a rubber sheet, then stretch or distort the sheet in different directions, the lengths of the lines will change, the angles at which they meet each other will change, but certain relationships among the lines will remain invariant despite the many transformations. The abstracting of what is invariant through many transformations is the description of what remains constant in spite of apparently drastic changes, the description of the elements of permanence in apparent impermanence.
>
> *invariance under transformation*
> (Hayakawa, 1950)

In the context of physical reality, even the terms used to designate the concepts above are generative. These reality designations would read: relational, relative, uncertain, complementary, reality, invariant through transformation.

The old paradigm of thesis, antithesis, synthesis is hardly applicable here. But neither is the idea of relativity alone, or of uncertainty alone; neither being useful nor comprehensive enough to serve as a substitute contemporary mode. An "either . . . or" orientation no longer suffices, regardless of rearrangements or substitutions of terms. Contraposition is simply irrelevant in regard to certain contemporary propositions concerning reality.

The theory of complementarity is more inclusive, and also reminiscent of a useful contemporary supplement to the older and more primitive "either . . . or." That is, in the theory of complementarity one can recognize the structure "both . . . and." It appears irrefutable that a more open system of receiving and processing information is required today than is supplied by many traditional and time-honored concepts alone, such as contraposition, Aristotelian logic, thesis-antithesis, et cetera.

The use of only pre-atomic ways of processing information, in many instances structures out the possibility of understanding reality concepts which are intricate and interpenetrating. For example, one element simultaneously may be an interdependently autonomous part *and* whole, thus being inextricably independent-dependent-part-whole all at the same time. This is a common phenomenon, but non-containable in obsolete and absolutist

kinds of logic. An individual experiences this multidimensional reality continually, for an individual simultaneously is a whole individual and a part of whatever group he is in at the moment, be it two or two hundred.

Even as he is one, he may be a one-hundredth becoming a one-half. Precise, exclusive, absolutist categories simply cannot contain many such omnipresent realities without the concurrent presence of more global ones.

The last quotation in the above group of quotations is of a slightly different quality from the preceding four. It furnishes a timely analogue which previously introduced and now adds circularity to this discussion. It was subsequent to a search for what remains invariant in education, regardless of any conceivable changes or transformation, that the last quotation was found, and was recognized to be an analogue for the preceding search.

On page three, under the heading of "Rationale", there are listed some aspects of education which came to be considered under transformation. A relevant question thus became -- in a shifting world of uncertainties, what can offer a firm base for education? "Manner of thinking" or "processing that is inherently self-correcting."

Immediately the question becomes, how can this be effected? By catalyzing "viewpoint awareness," is a large part of the answer to that question, as is "increasing perception of, and response to, every-enlarging wholes."

Modern mathematics, and modern science, are continuously shifting, yet continually maintaining equilibrium, as changes occur in their understanding, their perspectives, their perceptions of data concerning the atomic world, the world underseas, and the world of outer space. These shifts in thinking are public knowledge, publicly announced, described, and aired, and comprise highly significant notices of changes in reality-orientations to those who are receptive to incoming communications. For communications to be received, however, a system that is open for receiving is a prerequisite.

Indications for a need to supplement society's and education's traditional ways of processing become clear. A current understanding of reality makes evident that viewing a question from one side only is insufficient. With such an approach one can merely have a single view of

things, "formed under special circumstances which only a minority of [others] could possibly share"(Richards, 1968).

The critical task for education becomes to consider how "to find out what educational techniques might be devised to help people in looking at things from all sides and putting the views intelligibly together. . . ." (Richards, 1968) Unidimensional thinking cannot comprehend a multiplicitous, interdependent, interpenetrating world.

Perspectives Critical for Correcting Thinking

Eli Bower (1965) says that the process of education is the process of helping students become persons who can take in information, organize it, combine it with old information, and utilize it in their behavior.

It is the specific basic principles which underlie such information-gathering, processing, and utilizing with which this paper, and with which self-correcting education, are immediately concerned. The remainder of this chapter will explicate the principles that underlie processing that is open to, and able to utilize, new information even when such information is threatening; principles which apply to elements of permanence which inherently facilitate constructive processing.

Richards (1968) sees doing this as a function of an unshakeable awareness that any information is just a point of view; Erikson (1950) too, implies that all any man can offer another is his way of seeing. Arieti (1967) believes that "It is in the various ways that man responds to similarities that he constructs his future." Hayakawa (1950) asks, "Why are we not constantly on the lookout for differences as well as similarities?"

Roy Menninger (undated) specifically discusses how to prepare teachers to understand the emotional life of their charges, how to use this perception to enhance the teaching-learning process; how to help teachers recognize and deal more effectively with their *own* feelings and reactions, learn about basic human feelings and the effects of emotions on behavior, simultaneously becoming more effective at helping themselves and their students to become better persons and better learners. Menninger (1968) sees several critical needs, one of which is to provide a model of a different way of operating, a way which manifests itself in constructive and task-oriented problem-solving.

Each of these, and all of these, appear to be related to dimensions that are invariant, dimensions that are critical to understand in order to catalyze processes that routinely, flexibly, and constructively utilize change.

It is important in differentiating any dimension to understand as many of its facets as possible. The most useful way to clear the ground in order to begin construction of the new is sometimes an identification of the obstacles, specification of the underbrush which needs to be removed. Understanding how not to think is, in some instances, the logical prerequisite for beginnning to discover and evolve an alternate way to think. One may need to know what specific behavior to inhibit, in order to permit higher-level behavior to evolve.

Sometimes one's learning has included learning ways to resist certain kinds of learning. Traditionally educators have been unaware that their ways of setting limits for behavior, at the same time set limits on future learning.

Really seeing is not merely a matter of looking at an object, or event. What one is able to perceive is limited by what one has learned to observe, can bear to observe, and can cope with the consequences of having observed.

Henderson (1953) discusses this same phenomenon in the context of speaking. He suggests that a communication consists of first, what a person wants to tell; secondly, implications of what he doesn't want to tell; and thirdly, implications of what he is unable to tell. The principal features of an event often are apparent only in what is *not* reported.

This seems to be precisely the point with regard to moving toward self-correcting thinking, and moving toward other normal growth. Often what is *not* done to *hamper* growth, is what is most conducive to healthy growth. Consider dieting as an illustration. The important thing is what one does not eat. Too much, even of something absolutely essential, as food is, easily becomes maladaptive. Consider learning and educating in such a context. Higher-level behavior can only appear if the behavior on lower levels has been inhibited in advance. To clarify a complex communication is often to simplify it, to shorten it, to remove all extraneous material. What is no longer there is responsible for the resulting clarity.

Similarly it seems essential to learn how not to impede one's perception of new information. It has been said that the obvious is a proposition that we wish to disregard (Henderson, 1953). Delineating how to bypass the pitfalls which induce one to disregard and overlook the obvious is the immediate purpose of the following discussion.

Preconceptions, or expectations, often distort what one sees. They can also shape and change events into something they really were not when erroneously perceived as such (Rosenthal and Jacobson, 1968a). Restricting personal processing only to pre-existing categories inescapably distorts. The most common obstacle however, is a concern with one's own security needs. One's own unsolved problems may not leave one free to look outward unrestrictedly.

Strong emotions commonly interfere with reality-perceptions. Fear of emotion, especially of painful emotion, can prevent one from really seeing a situation. One's own experiences can distort the ability to perceive others' experiences, sometimes increasing the possibility that any similarities will be over-valued and dissimilarities correspondingly suppressed.

Sometimes a prepotent fear of any change is operating, and the perception of anything new is automatically prevented from coming into awareness (Arieti, 1967; and Shapiro, 1965). Cultural expectations often distort one's perceptions of a sub-culture or of another culture.

Defensive maneuvers usually accompany the perception of information that is felt to be threatening. Since the threatening stimuli are pushed out of awareness, they are never really looked at, or examined, or seen as what in reality, they are. Contemporary events which resemble past events that once were threatening often are erroneously and automatically perceived as identical, and therefore also as threatening. Similarity is confused with, and perceived as, identity.

This problem, like any problem, is simultaneously a challenge and an opportunity. One's defensive maneuvers can be utilized to alert oneself to the fact that, since he is reacting defensively, he is therefore perceiving defectively, in response to internal archaic stimuli rather than to present external ones.

Defensive behavior signalling misperceiving commonly includes such neurotic defenses as 1) defensive hostility -- fright causing a counterattack, and often taking the form of a belittling of the new. This may be followed by 2) projection -- they are attacking me. A third usual defense is an identification with the aggressor, in which one dependently rushes to get on the other fellow's bandwagon. A fourth defense is simple denial, the conscious feeling and the verbalization usually resulting in a generalization that there's really nothing new about this new thing at all, it's just what everyone's been doing all along. Fifth is a reaction characterized by turning against the self -- I'm no good, I don't know enough, I'm not equal to understanding something that difficult (Hollis, 1963).

A healthy mind, aware of inabilities intrinsic to living at this time, aware of common obstacles to perceiving and to examining new information realistically, uses information about such obstacles to begin to alert oneself to one's own defensive distortions. One can begin to use such knowledge to recognize areas in which he is particularly vulnerable because of his own life history, using this information to re-organize his thinking in more reality-oriented ways. Thus information previously, automatically, and usually erroneously, perceived as threatening, can begin to be processed in a more realistic manner. Thinking then can increasingly move toward eliminating distortions within its own style of functioning.

In a relationship of concerned mutuality, one can discover personal areas of uneasiness and defensiveness, and also confront threatening information more constructively. Contrastingly, hierarchic relationships heighten, rather than lower, defensiveness, thus structuring out the possibility that one can lower his defenses long enough to become aware of, and examine, vulnerable areas.

The external environment, including the persons in it and their ways of operating, thinking, and reacting to the events which confront them, structure in certain possibilities and structure out others. Among these possibilities is the possibility that the persons involved in any activity, can engage in constructive correcting of their own processes of thinking. Unless compassion and support are regularly experienced in their interactions, self-correcting will be highly unlikely.

When one asks himself how educators could have allowed the educational system to deteriorate to such a degree, a critical question arises. What actually has been structured in, and what has been structured out of the educational system? How is it possible that even today many educators are unable to recognize the need for changing obsolete educational goals and methods?

Unawareness of the common obstacles to constructive thinking is very likely a large and important part of the answer. But there is also more. Fortunately some recent publications (Arieti, 1967; Bettelheim, 1966; Richards, 1955, 1968; Shapiro, 1965) offer information related to these issues.

Their communications appear to be essential for understanding the principles underlying evolutionary thinking. The following section will discuss the most important of these.

Additional Evolutionary Dimensions

When the educational concern is to structure in certain possibilities, certain dimensions become highly critical. What is not, invades the structure of what is (Buber, 1966), and what follows depends upon what has gone before.

First of all, in order to structure in congruity between objectives and outcomes, the sequence of steps taken to move toward those objectives must be structured so that each is rigorously congruent with the objectives themselves.

Originally education in this country was to serve two functions, those of preparing leaders and of preserving class integrity (Kagan, 1968), not that of empowering every learner. Schools were intended to be a screening device, eliminating all except a small elite group. Viewed in terms of those specific objectives, schools could be considered enormously successful. Those two objectives, however, accounted for only a small part of the total results. Cumulative results included others which negate those partial ones which, by themselves, seemingly were successful.

A selection of educational goals is simultaneously the selection of a major determinant of the nation's quality of thinking, and a major influence on the quality of existence that is possible for the nation as a

whole. Those making decisive long-range plans for education, even now apparently remain unaware of some significant and concomitant effects of their planning. Perhaps they confuse conscientious attacks on parts of problems, with constructive approaches to whole solutions.

There are two ways of perceiving and responding to stimuli, one being part-perception and part-response, Whyte's "separatist", and the other being whole-perception and whole-response, Whyte's "global". That is, one can perceive the part as part, simultaneously being well aware of a larger whole, and of the interdependence of the part with the whole. One would then respond to the part in terms of the whole. This is whole-perception, and whole-response.

One can also perceive the part and only the part, unaware of the existence of ever more inclusive wholes, and mistaking the part for the totality.

The first way of perceiving and responding -- in terms of ever-larger wholes -- tends toward reality-orientation and accuracy, and is more likely to result in constructive thinking and constructive action. It is antithetical to an over-investment in "*the*" "*right*" "*answer*" and in the status quo.

The second way of perceiving and responding is self-deceptive and distorting. It artificially twists much of what is true of the part into falsity with regard to the whole. It is characteristic of self-defeating, primitive, pathological, psychopathological, and destructive thinking.

Perceiving in terms of the whole is most likely to lead to a questioning approach, since this orientation includes the assumption that there is more to an event than is likely to be evident at first glance, or first thought, and often more than yet has been discovered.

Perceiving in terms of a part leads to the easy conviction that one already has, or can have, the entire truth of the matter, and results in an authoritarian orientation. It inhibits self-examination, the formulation or testing of alternative hypotheses, further exploration, discovery, and growing understandings. It also largely eliminates flexible and constructive use of change, and thus structures out a reality-orientation.

It may be useful to furnish a sample of ways of thinking, in a kind of dialectic process, in which some of the aspects of self-correcting

thinking become specific. The viewpoints in the following discussion with Kubie (1954), illustrate differences in part-whole perception, in similarity-identity perception, in perception of means-end congruence, in perceptions about human nature, and in levels of differentiation. In short, there are observable differences in ways of thinking that are highly critical in regard to thinking. The alternatives raised illustrate these differences and tend toward increasing the reality-orientation and the accuracy of the communication.

Kubie's writing which furnishes the basis for this discussion was published some years ago, and was termed "The Forgotten Man of Education."

Kubie describes "self-knowledge in depth as the ultimate goal for culture and education" and says that this "must include an understanding of unconscious as well as conscious levels of psychological processes." Education must provide insights, must communicate "insights to successive generations. . . . Self-knowledge in depth [must] become the goal of a new concept of education."

In these statements there appears to be confusion of means and end, and in addition, questionable assumptions. If the educational context is perceived as one which includes action other than mental action, which in reality it does; and if education is seen as involving preparation for future action, which in reality it is; then it seems highly debatable that "knowledge" and/or "understanding" -- regardless of kind -- can be posited as "ultimate" goal. Understanding is most assuredly essential, and just as surely not ultimate. Rather it is a means toward a larger goal. Knowledge and understanding, unless reflected in appropriate and constructive action, are impotent.

Practical competence goes beyond mere understanding, and requires a body of concrete skills, plus an ability to comprehend what one is doing as one is doing it.

Kubie's perception that a necessary but insufficient means is an ultimate goal, appears to abort the possibility of his developing a more tenable, logically defensible, and more comprehensive extension of his thinking.

Additionally, to see education's role as "providing insights" and as "communication of insights" also appears to reflect part-perception

rather than perception of the whole. A widely accepted belief among many psychologists, with which I strongly agree, is that creating and structuring the possibility for another to discover insights for himself is often the only way to insure that insights relevant to "unconscious levels of psychological processes" have a high probability of being perceived, accepted, and utilized in subsequent behavior.

Also, in the context of "self-knowledge in depth" and "unconscious levels of psychological processes," it is highly likely that attaining an insight would be but a beginning, and quite possible a beginning on a path that was markedly circular, lengthy, and shaky. When one has built a repertoire of habitual and automatic behavior based on one assumption, it may take a great deal of re-experiencing and reorganizing of ideas, actions, and feelings, before one's behavior is congruent with an insight which is new. The usefulness of the discovery of an insight begins to be evident only as the insight "becomes a part of life." (Erikson, 1950)

Implementation by the educator would therefore require a flexible and appropriate use of skills in communicating relevant insights *and also* in creating the context for the learner to discover his own insights.

Kubie's partial clarification of these points seem likely to interefere with undistorted comprehension of information otherwise useful to the educator.

If we turn to a different educational context, where there is only one side of an interaction to observe, the critical nature of process effects on the possibilities open to another, is dramatically highlighted.

Some educators and psychologists who presently possess viable understandings of interactions which structure in healthful, constructive, reality-oriented ways of thinking, already are creating educational programs for computers which illustrate the basic principles for empowering the learner. Goal, purpose, structure, process, and content of these scripts offer a communication and an experience that is a coherent whole.

A brief illustration of two contrasting hypothetical computer interactions, written for high school seniors, is shown below.

A. *Let's pretend that you are at a candy counter;
there are six different kinds of candy to choose

from: 1) fudge, 2) walnut fudge, 3) marshmallow fudge, 4) chocolate mint, 5) divinity, and 6) peanut-butter fudge.

Type the number showing the kind that you would choose.

*You probably do not know it, but you have just done something very important in your life. You have actually decided something.

B. *If you could be a licensed driver, and also have the use of any car that you wished for the next five days, what kind of car would you prefer to use? Type the kind here.

If you prefer to select some other item, simply substitute it each time for the word "car".

*What are some of the reasons that influenced you the most when you selected your car? Type them here.

*Different people have different ideas about the ways they make decisions so that they will prove satisfying to them.

What kinds of things do you find it most helpful to consider when you make major decisions?

The two script examples will be discussed in the frame that has been continuously evolving throughout the paper. The purpose of each sample is hypothesized as being to encourage independence and self-reliance.

A) Means-ends congruence is absent; the inquirer is told what to do, and thus put into a dependent, passive, submissive frame.

B) Means-ends congruence is high; the inquirer is permitted to actively initiate, to *be* independent, within the necessary framework.

A) The content subject (candy) is suitable for a person who is very young, and therefore has connotations of a passive, dependent kind.

B) The subject of the content (driving, selecting a car) connotes maturity, independence, active mastery, adult skills.

A) The assumptions and exceptions, communicate that life experiences have not resulted in any learning by the inquirer [everyone continually makes decisions, beginning in infancy]. Controlling the inquirer's choices, and telling, are apparently assumed to be beneficial to learning. Such reasoning is fallacious.

B) The assumptions and expectations communicate that the inquirer is mature, capable, competent, and reasonable; and can make his own meaning if he is permitted to do so.

The probable process effects on learning are:

A) Infantalizing; to structure in a passive responding to someone else's choices and meanings has structured out personal independence, and therefore is antithetical to the stated purpose of the script.

B) Empowering; to participate in the active discovery of knowledge is to be independent. Also, it is true learning.

There are many alternative ways of using human knowledge, as the wide range of human cultures clearly demonstrates. Sometimes a culture mainly requires its members to adjust to the status quo, depriving both the individual and his society of his unique contributions. Richards (1955) says that education has been crippled by a failure to imagine what it could do.

Any purpose inherently defines which processes, actions, and information will be relevant to it. When the purpose is learning, a focus on learning processes is essential, as is information focusing on learning how to learn.

To specify and make explicit the processes experienced during learning, the processes the learners go through, raises awareness and understanding to a higher level. Careful questioning ["Were you aware that . . .?"], catalyzing careful differentiating, specifying, and reaching for

larger wholes, is inherently empowering to the learner, both in the present and also in the future. A learner who experiences himself as both subject and object simultaneously is bridging inner and outer reality, and enhancing his total learning.

The most critical processes are those which structure, and determine how one can in the future process. One's mental processes define future opportunities, options, and possibilities. Some processes will enable, others will prohibit, any future learning.

It seems important to learn to discern which is likely to result in which.

Implications for Education

It is the conviction of this writer that a basic dimension, a fundamental determinant of all thinking and behavior, is the discrimination between part-perception and response, and of whole-perception and response. This is not an "either . . . or" situation. It is a flexible and appropriate use of both, plus the awareness of the interdependence of both, that seems most characteristic of self-correcting and of higher-level thinking.

Part-perception, if it is not superseded developmentally by increasing perception of wholes, is anti-evolutionary, regressive, and often destructive. Those concerned with learning need consciously and continuously to reach toward a perception of larger wholes, and in every way possible to model, demonstrate, specify, and explicate this dimension. Whole-perception, and response in terms of the whole, are inherently self-correcting. Also it requires a concern with precision of differentiation, it is inherent in viewpoint awareness; and it is the single most critical principle with regard to higher-level processing.

It seems possible to look at almost any *un*successful educational practice and discern part-perception and response, with a consequent confusion among similarity and identity. That is, a part equivalence is perceived as an equivalence of the whole, or identity. For example, telling has long been confused with teaching, and teaching continually confused with learning; motion has been confused with active participation, imitating and copying with thinking; facade has been confused with reality, and role with personality; competition has been confused with destruction,

dehumanizing socialization with humanizing; fragmentation has been confused with comprehension; cognitive with mental; rigidity with strength; and words with communication.

Actually confusion of similarity and identity is a significant indication of primitive, and of pathological, thinking. Unfortunately it is also characteristic of the thinking of many persons now teaching, and therefore it tends to be perpetuated in those who are being taught.

Censorious as such statements might appear, they are not intended to be so. The present situation exists largely because for a long time the essential knowledge was not extant. Only recently has relevant and comprehensive information which offers an opportunity for understanding thinking processes, become available. Even now it is not in a form regarded as readily usable by the typical educator. Rather the information is of a highly specialized type, is implicit rather than explicit, and mainly is only to be found in the writing of psychologists, psychiatrists, and psychoanalysts.

This paper is a preliminary attempt to specify some emerging convictions concerning the role of thinking processes within the kind of education that is psychologically aware; aware, for example, that cognitive inescapably includes emotional, motivational, volitional, and conative elements. Such education recognizes the importance of understanding the basic principles of growth, of total mental development, of learning, of interactions, and of constructive ways of communicating. It is reality-oriented.

In the past many educators have searched for the kinds of information that are only now beginning to become available. Knowledge essential for empowering the educator to empower the learner is appearing at last.

A logical next step would seem to be to translate this highly specialized knowledge into readily understandable and usable form, to emphasize means of implementation, and to attempt to reach as large an audience as possible.

The time seems appropriate, in Richard's words, to begin to look at things from all sides, and to devise ways to put these views together intelligibly. (Richards, 1968)

This the following chapter will attempt to do.

CHAPTER III

SELF-CORRECTING AND EDUCATION

Introduction

This paper began with a focus on ways of thinking about challenging educational problems. It defined education as a relationship, a dynamic interaction, centering on ways of thinking about thinking, and on the individuals' mental, or psychological, development.

Thinking was conceived in a comprehensive frame, and recognized as a function of the total person. It was realized that particular ways of thinking structure certain possibilities in and structure other possibilities out, both for self and for others with whom one interacts. Ways of thinking were shown to affect possibilities for the learners' growth and development, both in the present and in the future.

It was proposed that, since individuals are both social and individual, the need is, in Ekstein's (1968) terms, neither to separate nor to merge the learner's awareness of inner and outer reality, but to create a bridge between them which will heighten awareness and understanding of both. To make thinking self-correcting is to create such a bridge, enabling experience and intellect to join hands.

The first chapter focused mainly on awareness of the external world, of education, and of theory. The second chapter described ways that awareness of aspects of the outer world can be structured out, and distorted by, the absence of awareness of the inner world. Dimensions considered critical for correcting assumptions, both about the inner world and also about the external world, are a continuous thread throughout the paper.

The third chapter continues the emphasis on psychological development, on thinking, and on correcting assumptions regarding inner realities and external realities. It particularly emphasizes some recent contributions from Arieti and Bettelheim, whose works seem unusually corrective, generative, and empowering for education.

There is a great deal of recent information available which is self-correcting for education. Counselors and therapists, concerned with

children's inability to utilize their abilities, have demonstrated that changing the entire educational context has been essential in order to structure in the possibility of learner success. Nor is that all. Counselors and therapists have found it essential also that they not be perceived as a part of the teacher-principal hierarchy, in order to structure in learner success. Roy Menninger (1968) has provided a clear explanation of why this is so, and suggests what educators need to learn *not* to do, in order to remove the almost insurmountable blocks to learning that educators themselves continuously construct.

Arieti (1967) has provided the most detailed and comprehensive theory of the dynamics of development hitherto available, including careful descriptions of primary, secondary, and tertiary process thinking. Bettelheim (1966) has supplemented and elaborated these, by carefully delineating the role of emotions, and of interpersonal relations, in cognition. Together Arieti and Bettelheim provide more comprehensive and believable conceptualizations concerning development than previously have existed. These include comprehensive theory integrating phylogenetic, ontogenetic, and microgenetic development.

Biber, Grene, Gendlin, Hayakawa, Menninger, Polanyi, Richards, and Shapiro, as well as others, contribute immensely useful concepts to these ways of thinking. Each has a comprehensive view, and includes psychodynamic understandings in his perspective.

The communication that is demonstrated and delineated by the manner in which authors such as Arieti, Bettelheim, Ekstein, Menninger, and Redl describe their work, explain their thinking, and discuss their colleague's work, is often quite as remarkable as any of the findings and information they communicate. Apparent in their manner of operating, and ways of thinking, are the kinds of mental processing that seem most useful as an ultimate goal for education -- thinking processes so structured and organized that they themselves inevitably tend toward higher levels of differentiation and more inclusive integration. Such thinking is clearly self-correcting.

Some Perspectives from Arieti and Bettelheim

Silvano Arieti

In the book *The Intrapsychic Self*, Arieti examines psychological forms and development, including phylogenetic, ontogenetic, and microgenetic. Microgeny, described by Werner in 1956, is the immediate unfolding of a phenomenon, the sequence of necessary steps inherent in the occurrence of a psychological process. Certain similarities in these three fields of development are described; they are schemes of the highest forms of generality, involving all levels of the human mind.

Arieti stresses the role of primitive psychological forms, in feelings and external behavior as well as in cognition, because they reveal common trends and processes essential to understanding normality, psychopathology, and creativity. He also explains how, and emphasizes the fact that, concepts themselves become very important psychodynamic forces in development.

Arieti's methodology is similar to Heinz Werner's and Piaget's. His area of investigation is much more comprehensive than theirs, however, for he includes phylogenetic and microgenetic development, psychopathology, creativity, concepts of the unconscious, primary process, and motivation. He does not restrict himself to describing reactive and adaptational development, but also includes conceptualizations regarding future possibilities.

Like Piaget, Arieti sees the basic principles of cognitive organization as responsible for the way we interpret reality, and says that the psyche brings to awareness what was already implied in the living matter. The human order of cognition, which derives from the mesocosm, permits man also to understand the microcosm and the macrocosm.

Arieti describes his book as a prerequisite to the study of the interpersonal, and a forerunner of attempts to integrate the intrapsychic with the interpersonal. *The Empty Fortress: Infantile Autism and the Birth of the Self*, by Bettelheim, had been published earlier in the year. It particularly emphasizes the role of emotions and the role of interpersonal processes in mental development. Together Arieti's and Bettelheim's books furnish an invaluable, thorough, comprehensive study

of mental development. The books of these men include the findings from other more specialized studies by such men as Hebb, Werner, Piaget, Freud, Cannon, Erikson, and Whorf, to name but a few, and concepts from modern medicine, neurophysiology, anthropology, philosophy, psychoanalysis, psychology, genetics, linguistics, and the like.

Arieti in particular, explicates a comprehensive and unified theory of the dynamics of human development. His is a theory of enormous range and depth which forms a tremendously encompassing structure, enhancing the usefulness of many separatist concepts and offering a generative nucleus around which others can organize their own questions, insights, study, and experiences.

He offers a superb, detailed map of mental development, carrying the threads of cognitive, emotional, motivational, volitional, conative, and self-concept development through all their intricately interdependent stages and substages, explaining this interdependence, clarifying what is, what is not, what might be if this, or that, et cetera.

One critical thread in psychopathology, normality, and creativity is the ability accurately and simultaneously to register similarity and also at the same time, to register dissimilarity. Psychopathology is marked by unintentional confusion of similarity with identity, with no awareness of the confusion. Normality and creativity are characterized by an ability to discriminate between, rather than confuse, similarity and identity.

Arieti's book clearly explains how all of the cognitive stages except the final one are out of awareness. He describes the functional equilibrium of cognitive and affective components, an equilibrium now recognized as neurophysiological as well as psychological. Also he shows how great a part of emotional complications is related to cognition.

Thinking processes advance by stages, each accompanied by some emotions. In each stage there is an initial period of unconsciousness, and the process may remain unconscious or may finally reach consciousness. It is mostly the accompanying unconscious or physiological emotion which will determine whether the thinking will become conscious or not.

Arieti explains motivation developmentally in a comprehensive and enlightening way. He describes developmentally both primary process thinking and primary classes, and secondary process thinking and secondary classes. This is followed by a brilliant discussion of what he terms tertiary process. Tertiary process is a combination of primary and secondary processes in innovative and unpredictable ways.

His own book and Bettelheim's book are themselves beautiful products of tertiary processes.

Arieti's map of mental development is thoroughly useful whether the question concerns child development, psychopathology, pathology, or genius. The book is really quite incredible; it could literally change the shape and size of the fields of psychology and education.

Highly relevant for this paper is Arieti's examination of thinking processes. A brief summary of some of the major characteristics of those processes follows.

Arieti describes a primitive kind of pseudo-logic which very young children use, which he terms paleologic. This archaic logic is equivalent to Freud's primary process thinking, and both lead to the formation of primary classes which necessarily exhibit the same primitive, or false, logic.

A primary class is a collection of objects having some part in common, and by virtue of this common part they are believed to be identical and equivalent. The objects are freely interchangeable; and each is equivalent to all. There is no concept of a whole, nor any possible abstraction of an essential organizing principle which is inherent in the objects, or in their parts. The part that is dominant is simply the only element to which the organism readily responds. The organizing principle therefore is specific to the organism doing the organizing, rather than to the objects classified, and is completely external to the class which is formed. Such thinking and such classes result from part-perception, part-response, and partial abstraction, and are by definition primitive, idiosyncratic, and psychopathological, in older subjects not organically impaired.

Only children below the age of three years are incapable of progressing beyond such primary process thinking. However older preschool

children tend to continue thinking paleologically whenever there exists an inability to evaluate all of the elements; and whenever there is a lack of familiarity with other relevant and important notions. Such thinking is also apparent in adults, in crowd thinking, prejudices, political demagoguery, and dreams. Whenever emotions prevail over the normal progression of thinking, primitive thinking and primary process generalizations often result.

Characteristics of thinking at the level of primary or paleologic thinking, include the belief that everything is the consequence of will, i.e., a belief in teleologic causality; and an emphasis on denotation and verbalization, with a consequent unconcern with connotation, and a belief in "word-magic." That is, there is a concern with words as words, independent of their meaning, and bypassing the reality for which the words stand. Objects are things-of-action, and primary process generalizations, distortions, and exaggerations prevail.

The final stages in Arieti's theory of psychological development is the conceptual level. Here logical and coherent secondary process thinking prevails. Connotation, or meanings, become more important than words per se, and special high-level thought processes occur. Induction, deduction, deterministic causality, conceptions of the future, and conceptions of the possible appear.

Secondary process thinking results in secondary classes which, unlike primary classes, belong to the Aristotelian level of thinking. A secondary class is a collection of objects to which a concept applies; the objects are recognized as being similar, and it is on this similarity that their classification is based; there is a concept of the whole; the whole is separate from the parts; and the essential parts are separate from those that are nonessential. The organizing principle for a secondary class is inherent in the relevant objects themselves.

In secondary process thinking the concept of deterministic causality makes it possible for will and wish finally to become separated from causality. The acceptance of deterministic causality enables an individual to free himself from lower-level motivational factors. No longer need he be just a reactive entity at the mercy of emotions and primary process generalizations; he now can choose, select, and initiate. In order to

increase the validity of his thinking however, man needs continually to review and revise those apparent concepts which are actually disguised paleologic preconcepts.

Concepts are determined not only by direct thinking, which would include all the aspects of which one is aware, but also are determined by underlying factors, emotions, motivations, and ideas which may not be available in awareness.

In pathological and psychopathological thinking there sometimes is a fusion of primary and secondary process thinking, without awareness, without volition, and without intent. Such thinking is often conflictful, to some degree incomprehensible, and/or incommunicable, and even bizarre. Psychopathological thinking, specific to major psychiatric syndromes, has been differentiated by Arieti according to the processes, structures, and mental organization described in his theory of psychological development.

The creative process results when man transcends the constraints of ordinary secondary process thinking. At the same time the creative process is wholly congruent with, and in agreement with, the secondary process. The resulting process is one that Arieti terms the tertiary process, a special combination of primary and secondary process mechanisms. Faulty and archaic mechanisms are integrated with those of the normal secondary process, and can be communicated and shared. The tertiary process is consciously chosen as means for creative ends. The combination is conscious, integrated, and used with deliberate intent. Such combinations are innovative, unpredictable, intricate, myriad, and sometimes awesome.

In wit the tertiary process consists of a fleeting confuction, a temporary concordance between logic and paleologic followed by an almost immediate recognition of its discordance. In the comic, of which wit is a particular form, one expects to react to A and finds himself reacting to B instead, because of a confusion between similarity and identity, or misidentification. In parables there is a fusion or contemporaneous occurrence of several levels of meanings, the paleologic reinforcing the logic and thus creating a stronger medium.

In poetry the primary process is chosen as the medium through which the abstract concepts emerge; the similar in the dissimilar creating the

metaphor. The conscious displacement of the primary class member from the symbolic object in the poetry, to the real object which is brought to mind in the reader, joins the two, while at the same time they each retain their individuality. This permits comparison without identification. There is a harmonious blending of primary and secondary processes, easily communicated and shared.

The creative process in science entails the subdivisions of a secondary class which are kept clearly distinct, differentiated as finely as possible. In the preparatory phase, there is a loose aggregation stage at a very high level of abstraction; this loose continuity increasingly becomes an invariable association. The act of illumination consists of seeing an *identity* between two subjects previously thought to be dissimilar, and at the same time there is the realization that a new class has been formed, a conscious secondary class whose importance reveals a new ordering, and to which an indefinite number of members can be added. A universal principle is the result.

General characteristics of the aesthetic tertiary process are: 1) that paleologic and logic agree, paleologic reinforcing logic; primary and secondary processes blending harmoniously; 2) the concretization or perceptualization of the concept into concrete, tangible symbols is congruous with the original abstraction and actually reinforces it; 3) the negation has positive aspects, what is denied acquiring artistic reality; 4) there is an emphasis on verbalization with no reduction in the connotation, indeed some connotative aspects actually are accentuated and reinforced; 5) there is a pleasant sensoperceptual quality; and the emotional content is of the highest levels.

Arieti's book is a remarkedly useful one. It recognizes and profitably utilizes the knowledge that thinking, like living, involves factors that are overwhelmingly complex, interdependent, and interpenetrating, and also at the same time are inherently and convincingly logical.

Incorporating these understandings leaves "either . . . or" thinking far behind. It demonstrates the cogency and relevance of the more comprehensive and realistic "both . . . and" style of thinking.

Bruno Bettelehim

The subjects of Bettelheim's studies, described in his book *The Empty Fortress*, were autistic children, including some children without language. One of his major tasks was to discover what ways of behaving were effective in catalyzing movement away from a psychopathological condition and toward the condition of normality. The behavior that he delineates is essentially and critically empowering, and therefore maximally curative, and also preventive. And this is so even for children who had been severely damaged psychologically. It seems to me his writing also delineates the anatomy of extreme alienation.

Bettelheim shows how the very first life experiences spark the whole process of personality growth, and explains that the child's needs must be met, his desires recognized, respected, and as far as possible satisfied, in order to interest him in the external world. Gratification precedes any interest in beginning to do things on his own. Once the child begins to feel an interest in the world, he will also begin to grow attached to persons.

If a child's capacities for relating to reality do not receive adequate nutriment, development will fail to occur. The various steps in cognition are related to the child's vital experiences with life. Skills that are not learned for reasons that are personally valued have no positive meaning for the learner. Autistic children often do not acquire language, or do not continue its use, when it does not prove to be a means of making positive emotional context, with the persons around them. Like language, feelings also are separated out and refined only if there is hope of telling them to someone who responds appropriately.

What adults must convey to the child is that his expressions of his feelings are valued, understood, and accepted. Ways of expressing feelings will undergo developmental changes. But negative as well as positive feelings must be expressed, if development is to be normal.

Growth of the self, and growth in interpersonal skills, develop together or not at all. Both precede using language for communication.

Bettelheim clearly describes the birth of the self, and the development of autonomy. He believes that much of what we term normal

ability is dependent on the friendliness of the environment. When the child's actions meet with appropriate response, he experiences that reality is influenceable by him. The self begins with an active, effective using of reality, in the presence of persons who are influenceable.

The child's expectation that something outside of himself will satisfy his needs, powerfully increases his interest in knowing more about his world. How active an individual is allowed to be, and to what extent his own actions are allowed to make his life more satisfying, greatly influence whatever autonomy he will later be able to achieve.

Bettelheim writes that "autonomy grows best out of the conviction: it's important to me to do this, and that's why I'm doing it; not because I'm told I should (or must), and not because (even worse) I must consider important what others want me to consider important." (1966) Autonomy is gained only through a relationship, and then only if emotions also can be mastered. Development always is a dialectic process. Only as one reaches toward greater comprehension of others, does he become more of an individual himself.

Bettelheim differentiates, as few in psychology appear to do, between mastering an inanimate object and mastering interpersonal skills. He states that learning to interact with a person is not only more difficult, but also more important, and much the greater achievement. In differentiating between dehumanizing and humanizing socialization, he writes that it is dehumanizing to prevent an individual from feeling that his actions have a significant effect on his life and on others. Conversely, it is the validation from others of the expression of one's feelings, plus experiencing that one's actions really do have a noticeable effect, that is truly socializing, because it is most humanizing. A situation which permits an individual to feel that he is "master of his fate" simultaneously helps him to develop into a full human being. When one's actions have significant results, one naturally learns to take care in initiating action.

To prevent oneself from feeling, and to prevent oneself from acting in line with one's feelings, can result in an inability to become human, as the autistic child dramatically illustrates. What seems to

cause the extinction of feeling is a total repression of hostility.

Bettelheim presents evidence from various sources which indicates that, if an infant's anticipatory behavior is not responded to appropriately, his relation to the environment may begin to become deviant from the very first days of his life. A critical need, when one interacts with children, is to find solutions that respect their autonomous decisions while simultaneously assuring them of the kind of care that best suits their own development. If a child is prevented from being active on his own terms, or if his actions receive inappropriate response, he becomes flooded with impotent rage, unable to respond and react in a normal manner, and therefore unable to grow normally.

Encouraging the child to be active on his own is critical. So is including him in mutual activities, so that he experiences enough support to feel that together he can make a go of it, and that it will be worth his while to try.

When one feels he cannot influence the most important things that happen to him, when they seem to follow the dictates of some insensitive, inhuman, inexorable power, then one is inclined to give up trying to learn, give up trying to act, and to give up trying to change. One feels his trying makes no difference at all.

Bettelheim's book is a beautifully revealing delineation of both normal and non-normal development. The book is a landmark in the field.

Other Perspectives

In viewing any author's writing it is useful to be aware of the area he includes, and the areas he excludes, in his professional work. Undoubtedly one of the persons who has contributed much to the current understanding of thinking is Jean Piaget. Like Freud, Piaget has created a new discipline, that of genetic epistemology. His goal has been to identify the psychological structures that underlie the formation of concepts fundamental to science. He is not primarily concerned with the acquisition, but with the identification, of these structures. Nor has he been primarily concerned with specific psychological determinants. Rather his concern has been to understand intellectual development, to "unearth what is original and easily overlooked in the child's successive

stages of evolution" with methods "as free and flexible as possible." (In Flavell, 1963)

Piaget has confined his investigations almost exclusively to ontogeny, neither relating them to psychopathology nor to creativity. In describing the different levels of cognition, he deals with the conscious secondary process of each level, excluding the preceding primary process. His cognition mainly is an illustration of a maturing process of adaptation to external reality, and he is little concerned with the degree of conviction, or belief, the subject has in his knowledge. (Arieti, 1967; and Bettelheim, 1966)

His findings are not integrated with concepts of the unconscious, motivation, primary process, or with a psychodynamic understanding of development. For instance, Piaget, Laurendeau and Pinard imply that precausal thinking is an expression of a level of maturity, or immaturity, but are not concerned that this in no way explains how the child advances from acausality to teleologic causality. (Arieti, 1967)

The extreme degree of décalage present in psychopathological conditions cannot be readily explained within Piaget's frame of reference, and some of their uneven symbolic activity occurs much too soon, according to his timetable. He does not concern himself with reasons for either the presence, or the absence, of abilities. (Bettelheim, 1966) His concern has been with what already was, and not with what might be catalyzed to develop.

As early as 1932 Piaget was emphasizing the influence of wishes and inner needs upon thinking processes, yet he has generally avoided the motivational-emotional aspects of cognition. He himself does not point to practical implications of his work, or to educational practices, and he, like Erikson, assumes that personality does not emerge before adolescence.

These unexamined aspects were consciously excluded as irrelevant to his purposes. His concern was to discover already existing cognitive structures. He views the affective-personal-social realm in a cognitive context, stating that all schemas are both intellectual and affective, affect and cognition being indissociable. He views any structure as inherently motivated to function. (In Flavell, 1963)

Piaget has tremendously clarified how the normal child's thinking proceeds, explicating the child's capacity for insight, his methods of problem-solving, his cognitive style. Many of his conclusions regarding normal children are largely concordant with conclusions from studies of psychopatholical children (Bettelheim, 1966), with regard to the causes of particular types of thought.

Piaget's methods of investigation, as well as his conclusions, have been extremely influential and enlightening. He appears to have shown that all intelligence and thought manifest a logical structure, just as biological and social realities do. He shows that conceptual judgments are always relative to the position of the observer, who necessarily construes any concept internally. Reality therefore always includes and reflects this subjective element. An overriding concern has been to show that maturation and experience cannot be fully understood without consideration of the encompassing factor of equilibration. Equilibration is defined as an overriding principle of mental development in the sense that all mental growth progresses toward ever more complex and stable levels of organization. (1967)

In the nineteen thirties, Piaget and Werner began to change the face of knowledge concerning the successive stages in the maturing of cognitive functions, and concerning the processes involved in these stages. Piaget demonstrated ways of thinking about thinking that caused many to change their own ways of thinking. The area that Piaget and his colleagues separated out for examination has been studied with great specificity.

Piaget's main concern has been with the nature of knowledge, and with identifying the structures and processes by which knowledge is acquired. The many significant implications of his research transcend any narrow disciplinary approach.

Grene (1966) has written that knowing is necessarily an affective task, since it occurs within a knower who is human, alive, and feeling. Knowing is a personal act, involving a person with changing wants, needs, and feelings. Inevitably knowledge contains the personal outlook of the individual engaged in the process of knowing.

All knowledge has a human base; objectivity is the result of a subject's personal commitment to withdraw from consideration of certain vital variables. Objectivity is simply distanced subjectivity. The

possibility that there is an objective kind of knowledge is increasingly considered to be an illusion. The affective component is constantly operating in the thinker, who himself is the instrument of knowing.

Redl says that whatever is thought results in some kind of experience for the thinker, an experience which affects his whole person, his age, his sex, his emotions, values, attitudes, and all the rest of his personality. All are influencing variables affecting his thinking, experiencing, his acting, and reacting. Inescapably one's experiences involve one's whole self.

Biber (1963) writes that positive mental health includes the ability to realistically perceive the self, and the interactions of the self with others. She writes that attaining independence from the distortions resulting from inner awareness is no less important than attaining independence from social unawareness.

Menninger (1968) suggests the extensive and radical revision of the structure of public education is needed in order to alter its strongly negative effects. He sees the needed change as one that effectively epitomizes a mature ego stance. That is, it would be reality-oriented; recognize that internal feelings and conflicts are as important as external issues and tasks; permit pragmatic testing of values; and would create enough room, both physical and psychological, for this critical testing.

He suggests four qualitative shifts in the behavior of the educator: 1) toward experimentalism, or problem-solving task engagement; 2) toward reflection and discussion, increasing relativism and two-way interaction; 3) toward legitimatizing feelings, including negative feelings; and 4) toward a more systematic operational knowledge of behavior, including the educator's own, and the ways in which it affects the behavior of the learner. Menninger strongly urges moving away from the more medieval view of dependence on dogma and authority, to a trust in the human ability to problem-solve.

Dependence on dogma and authority is dependence on the solutions of others, on people who were not in this situation, were not confronted with this particular problem, did not have these same resources and information, did not know these people, and were not able to call on these particular individuals for help.

Biber (1963) has suggested that levels of maturity of thinking be jedged by the character of the processes involved, rather than in the evidence contained in the end products of thinking, such as solutions to problems, or quantity of stored factual information. Emphasis would be placed on the qualitative value of responses, and a systematic effort made to stimulate the differentiation of thinking processes.

Bettelheim (1966), concerned with catalyzing sound development, perceives success in terms of how enriched the self and its mental processes become during involvement with the chosen task.

Such views of educational goals and methods diverge strongly from those that have been utilized in the past. These contemporary thinkers, men and women in the forefront of their fields, are offering and demonstrating increasingly differentiated ways of thinking about thinking.

Implications for Education

If learners are ever to become able to participate in education that actually is maximally empowering, a first essential task is to empower the empowerer. Critical implications and understandings from Arieti's and Bettelheim's books seem most essential for empowering. With the understandings gained from them, the usefulness of separatist, specialized books is enhanced, and numerous other books then also become empowering. Their broad view is a balance for the more traditional, and narrowly cognitive, educational approach to learning.

I am convinced that a clear understanding of the three processes of thinking, which integrate and are integrated into a psychodynamic theory of development, as delineated by Arieti, can enable one to differentiate false logic from logic that is sound; can enable one to ask questions of the thinker that enable him to clarify his own errors in thinking; and can make it possible to explicate the processes of thinking that one reaches toward in order to attain a higher level of thinking.

In education concerned only with facts of a depersonalized nature one cannot always differentiate between thinking processes. Education worthy of the name not only differentiates, but also specifies and encourages thinking that is always advancing toward a higher level of integration.

As Richards (1955) says, we do not develop a mind by giving it more facts. Thinking and reasoning are the mind's basic tools. They develop by discerning and judging relevance. Relevance is strengthened through more inclusive mental activity, where feeling, direction of the will, and intellection come to terms and develop together. With interconnected relevances, more comprehensive meaning can be made.

Growth is usually defined as a process of further differentiation and ever more inclusive integration. It seems also to be a process of increasing one's repertoire of available options, while simultaneously increasing one's freedom in using this repertoire.

In other words, it is not necessary to perceive the artist as having strangely maintained -- and developed! -- the integrity of assimilative systems that are absorbed or displaced in the rest of us, to quote Bruner (with Olver, and Greenfield, 1966) quoting Neisser. Rather the artist may have successfully integrated what others maladaptively suppressed. The artist may develop in a way that allows him to retain and increase the repertoire of actions available to him, responding in a "both . . . and" fashion. Others, being less concerned perhaps, and therefore less aware, may have unwittingly responded in the more primitive "either . . . or" mode, with its usual result -- that of constriction, rather than of freeing.

It appears increasingly evident that men routinely act in ways that are not contained in any of our theories. Individuals continuously experience and perceive more than most theorists seem willing to explore or admit.

Arieti and Bettelheim seem to be changing this situation.

Hayakawa (1950) has written that Socrates not only said, "Know thyself." He also said, "Whatever authority I may have, rests solely upon my knowing how little I know."

Erikson (1950) has said that small differences in interactions with children "are of lasting and almost fatal significance in differentiating a people's image of the world, their sense of decency, and their sense of identity."

In the atomic world any individual can know only a little. This makes it more imperative that the little include the ability to perceive

and differentiate "small differences" of "fatal significance." That is, it seems imperative to learn how best to continue to learn.

Conclusions

Learning is changing. It results from personal experience. Each of our individual worlds exists as it does because of the ways we think, and because of the ways we cannot think.

Kelly (1955) has said that,

> Ultimately a man sets the measure of his own freedom and his own bondage by the level at which he chooses to establish his convictions. The man who orders his life in terms of many special and inflexible convictions about temporary matters makes himself the victim of circumstances. Each little prior conviction that is not open to review is a hostage he gives to fortune. . . . The man whose prior convictions encompass a broad perspective, and are cast in terms of principles rather than rules, has a much better chance of discovering those alternatives which will lead eventually to his emanicipation.

Possibly for the first time it is reasonable to say that knowledge exceeding any educator's needs is available. At this moment in time the state of knowledge is such, that, whatever information about mental development is needed, it is available.

The critical question becomes whether or not the individual can take in, process, organize, and utilize new information as it becomes available. To that critical issue, this paper was addressed.

Richards (1966) suggests the one does not find anything unless he knows in some sense what he is seeking; for finding is an end phase, and consequent to a search.

The creation of the Foucault pendulum suggests a perspective and possibly a direction that education too might seek. With enormous effort, over a period of a great many years, many people endeavored to construct some kind of energy system powerful enough to keep an object in motion for an indefinite period of time. The Foucault pendulum actually exhibits infinite motion. This motion is solely the result of the processes inherent in the entities involved. The power sought was discovered in a man's way of thinking. He was able to make it possible for certain interactions to occur.

A tremendously sophisticated understanding of actual, possible, and impossible process outcomes was required. Not only was knowledge of each process essential; essential also was knowledge of their complex interpedenpent interactions with each other, under widely varying conditions. These capacities had always been intrinsic to these entities. Only a certain way of thinking about them had been missing.

The Foucault pendulum seems also to be a beautiful analogue for the kind of education that, only now, has become really feasible. This way of educating requires a sophisticated understanding of mental development. It requires a comprehensive understanding of processes: normal processes and distorted processes; phylogenetic, ontogenetic, and microgenetic processes; social, cultureal, interpersonal processes; teaching processes, learning processes; and institutional processes. All of these understandings have been precursors, essential forerunners to beginning now to perceive, understand, specify, and describe the phenomena that are most relevant and essential for learning -- and so for education.

Erikson (1950) referred to this kind of orientation long ago when he wrote,

> Whatever his age, we apply ourselves to his capacity to examine, to understand, and to plan. . . . We begin with the processes *inherent in the organism*. . . . We would hope that [all] might derive a deeper humility before the processes that govern us. . . . [All] processes are aspects of one process -- i.e., human life.

A choice is confronting educators. The choice is real, unavoidable and urgent. Some choices will enable learning, and others will prohibit it. Some will move toward correcting, some toward further crippling.

Knowledge sufficient to our needs exists. Major breakthroughs have occurred in understanding the human processes of understanding. Thinking and reasoning are basic tools in these processes. The choice of how, and for what ends we use these tools is ours.

> "To what source should we look for the hope of the world's future?" asked Karsh of Albert Einstein.
>
> "To ourselves," answered Einstein.

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